the recently enacted speed zone restrictions) and continued study and monitoring are necessary to maintain the manatee populations in Sarasota and Florida waters.

IV. SUMMARY

The different indicators of manatee abundance were ranked for each year from highest to lowest to identify annual trends (Table 8). The average value from all six years for each indicator is also displayed. In 1989, highest values were observed for total number of manatees, manatees per hour in the north, south and total survey area, average number of manatees per flight, average number of herds per flight, and maximum population as well as second highest mortality although calf percentage and herd size was among the lowest of all years. Both years in which only the north region was surveyed displayed some of the lowest values for all variables except herd size which was highest of all six years in 1985. This could be the result of observer experience or lower manatee populations in the north. After the south region was added, 1987 showed low values for many of the indicators except calf percentage and herd size. Additionally, some values decreased in 1990, such as maximum population, possibly as a result of reduced numbers of surveys.

The average number of manatees sighted per hour was higher in the south ($\bar{x}$=10.6, s=2.4) than either the north ($\bar{x}$=3.8, s=1.1) or total survey area ($\bar{x}$=6.2, s=2.4) as are most regional parameters. The maximum population ($\bar{x}$=107.2, s=15.3) has been fairly consistent until 1990 when decreased surveys may have decreased the average and increased the standard deviation. Calf percentages ($\bar{x}$=11.9%, s=1.2) were higher than those reported in similar studies of other areas. Pansy Bayou, Forked Creek, and Turtle Bay are examples of areas with generally high or increasing counts of calves as well as adults. These habitats seem to provide favorable conditions and may have high nursery value. Mortality, especially due to human related causes, has increased and must be checked if manatee populations are to recover and flourish.

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APPENDIX A. TABLES

Table 1. Water clarity scale (m=meter)

Scale		Visibility Through Water
EXCELLENT	=	Greater than 3m.
GOOD	=	2-3m.
FAIR	=	3/4-2m.
POOR	=	1/4-3/4m.
BAD	=	Less than 1/4m.

Table 2. Surface conditions scale.

Scale	Effects observed at sea
0	Mirror-like seas.
1	Ripples with appearance of scales.
2	Small wavelets; crests begin to break; scattered whitecaps.
3	Large wavelets, crests begin to break; scattered whitecaps.
4	Moderate waves, taking a longer form; many whitecaps; some spray.

(Adapted from the Beaufort Scale, which is not suited for nearshore use).

Table 3. Summary of surveys. (MC=Mantee Count for north & south.)
(TOT=Total count for entire area.)

LTR	1985 DATE	TOT	1986 DATE	TOT	1987 DATE	MC	TOT	1988 DATE	MC	TOT	1989 DATE	MC	TOT	1990 DATE	MC	TOT
A-N	1/7	1	3/12	0	1/29	1	3	1/15	0	4	1/10	3	53	2/8	6	61
-S					1/30	2		1/16	4		1/12	50		2/13	55	
B-N	1/22	0	3/24	2	2/4	1	2	2/22	0	5	1/30	7	99	3/27	8	44
-S					2/12	1		2/18	5		2/1	92		4/9	36	
C-N	2/9	0	4/7	4	2/21	1	1	3/31	15	54	3/13	0	63	4/19	9	65
-S					2/26	0		3/31	39		3/14	63		4/24	56	
D-N	2/18	0	4/24	12	3/11	1	18	4/27	19	99	3/27	13	103	5/18	17	34
-S					3/12	17		4/29	80		4/3	90		5/25	17	
E-N	3/3	4	5/5	19	3/23	4	60	5/10	6	64	4/19	10	62	6/11	30	71
-S					3/25	56		5/11	58		4/18	52		6/14	41	
F-N	3/20	4	5/22	9	4/6	0	53	5/23	21	69	5/4	23	79	7/17	15	77
-S					4/8	53		5/26	48		5/5	56		7/19	62	
G-N	4/1	2	6/2	14	4/20	5	68	6/2	9	84	5/15	26	94	8/23	36	58
-S					4/22	63		6/3	75		5/22	68		8/28	22	
H-N	4/17	11	6/16	6	5/16	13	54	6/16	10	75			41	9/19	9	43
-S					5/17	41		6/17	65		5/31	41		9/26	34	
I-N	4/29	7	7/7	20	5/27	24	108	6/27	11	42	6/12	38	95	10/23	32	50
-S					5/28	84		6/28	31		6/14	57		10/30	18	
J-N	5/13	20	7/14	8	6/9	27	89	7/11	8	62	7/1	54	117	11/6	39	78
-S					6/11	62		7/13	54		7/19	63		11/8	39	
K-N	5/28	19	7/26	18	6/23	13	86	7/25	10	86	8/22	39	97			
-S					6/24	73		7/26	76		8/23	58				
L-N	6/10	24	8/8	20	7/9	18	44	8/11	13	38	9/14	35	78			
-S					7/13	26		8/17	25		9/6	43				
M-N	6/24	14	8/22	8	7/22	25	40	8/25	16	16	10/2	43	57			
-S					7/24	15					10/3	14				
N-N	7/9	18	9/4	17	8/5	14	35	9/20	36	69	10/18	35	61			
-S					8/7	21		9/1	33		10/19	26				
O-N	8/6	10	9/18	9	8/19	18	59	9/28	28	103	11/1	34	89			
-S					8/21	41		9/27	75		11/2	55				
P-N	8/20	22	10/2	25	9/9	32	75			78	11/20	27	51			
-S					9/11	43		10/4	78		11/21	24				
Q-N	9/6	26	11/11	18	9/28	24	59	10/11	49	113	12/7	2	12			
-S					10/3	35		10/12	64		12/11	10				
R-N	9/23	26	11/26	11	10/20	27	40	10/24	38	109						
-S					10/24	13		10/25	71							
S-N	10/17	1	12/10	33	11/16	12	27	11/17	41	41						
-S					11/24	15										
T-N	10/14	17	12/26	12	12/10	8	26	12/6	14	47						
-S					12/11	18		12/7	33							
U-N	11/12	30						12/20	5	22						
-S								12/21	17							
V-N	11/25	4														
-S																
W-N	12/4	32														
-S																
X-N	12/10	21														
-S																
Y-N	12/23	1														

Table 4. Annual totals of surveys, herds, manatees, and average, 1985-1990. (x=average and s=standard deviation for 1987-1990 only)

Year	Surveys	Herds	Manatees	Avg. No. Manatees/Survey
1985	25	138	314	12.56
1986	20	136	265	13.25
1987	20	435	947	47.35
1988	21	608	1280	60.95
1989	17	587	1251	73.59
1990	10	315	581	58.10
Totals	113	2219	4638	
$\bar{x}$=	17.0	486.3	1014.8	60.0
s=	4.3	119.3	282.4	9.3

Table 5. Maximum counts for 5% of each year's flights, 1985-1990. (*= 1987-1990 only)

	North	South	Total
1985	32		
1986	33		
1987	32	84	108
1988	49	80	113
1989	54	92	117
1990	39	62	78
$\bar{x}$=	43.5	81.4*	107.2*
s=	8.7	11.0*	15.3*

Table 6. Distrbution of manatees in specific sites, 1985-1990.
*NOTE: Numbers in parenthesis refer to calf distributions.
KEY: 1.= % of surveys manatees were sighted (frequency).
2.=Avg. number of manatees/survey for surveys with sightings.
3.=Avg. number of manatees/survey for all flights for the year.
4.=Number of mortalities (1989-1990 only).

Site #:		1	2	3	4	5	6	7	8	9	10	11
Site Location:		SE Corner Anna Maria Sound	Long-boat Pass	Bowles Creek	Button-wood Harbor	Hyatt Boat Basin	Pansy Bayou	Phillippi Creek	Midnight Pass	Forked Creek	Turtle Bay	Big Slough
Year:												
1985	1.	64 (12)	12	4	16 (4)	8 (8)	32 (8)	8 (4)	16 (4)			
	2.	2.5 (1)	1.7	2	1 (1)	5.5 (1)	2 (1)	1.5 (1)	6.25 (1)			
	3.	1.6(.12)	.2	.1	.2(.04)	.4(.08)	.6(.08)	.1(.04)	1(.04)			
1986	1.	60 (5)	5	10	0	5	20	0	35			
	2.	3.1 (1)	2	4	0	3	1.25	0	2.4			
	3.	1.8(.05)	.1	.4	0	1.5	.3	0	.85			
1987	1.	25 (10)	15	0	25 (15)	20	40 (25)	10	20	55 (35)	70 (40)	40 (5)
	2.	2.0 (1)	1.3	0	2.6 (1)	1.5	3.5(1.2)	1.5	5.7	4.2 (1)	15.7(4.9)	3 (1)
	3.	0.5 (.1)	.2	0	.9(.15)	.3	1.4(.25)	.15	.2	2.3(.35)	10.2 (2)	1.2(.05)
1988	1.	20 (10)	10	0	30 (5)	5	40 (15)	0	5 (5)	30 (15)	71 (50)	29
	2.	4.2(1.5)	2	0	1.7 (1)	1	3.5 (1)	0	5 (1)	2.7(1.3)	11.7 (2)	.35
	3.	.8 (.5)	.2	0	.35(.05)	.1	1.4(.15)	0	.24(.05)	.8(.15)	8.4 (1)	.28
1989	1.	65 (12)	0	18	35 (18)	12 (10)	53 (29)	0	12	47 (12)	76 (59)	24
	2.	2.2 (1)	0	1	4.8 (1)	3 (1)	3.9 (1)	0	1.5	3.25 (.1)	15.9(2.3)	1
	3.	1.4(.12)	0	.2	1.7(.18)	.35 (.1)	2.1(.29)	0	.14	1.5 (.2)	12.2(1.3)	.22
	4.	0	0	0	0	0	0	1	0	0	0	0
1990	1.	30	50(30)	0	60 (30)	10 (10)	50 (40)	0	10 (10)	40 (20)	100 (50)	33
	2.	1	2 (1)	0	2.3 (1)	1 (1)	3.2(1.2)	0	2 (1)	2.7 (1)	8.8(1.6)	3.7
	3.	.3	1(.3)	0	1.4 (.3)	.1 (.1)	1.6 (.4)	0	.2 (.1)	1.1 (.2)	8.8 (.8)	1.1
	4.	0	0	0	0	0	0	2	0	1 (1)	0	0